CLAIMS

What is claimed is

1 1.   A method of handling lock contention, the method comprising the steps of:

2   a first requester transmitting to a lock management system a first request for a

3   particular lock on a resource;

4   wherein said lock management system manages locks on resources that may be

5   granted to a plurality of processes that can access said resource;

6   receiving a message from said lock management system that indicates that said first

7   request to lock a resource is denied;

8   wherein a blocking condition caused the denial of said first request;

9   wherein said message includes first data; and

10   based on said first data, said first requester transmitting a second request for

11   notification that said blocking condition should no longer cause denial of a

12   request for a lock on said resource.

1 2.   The method of claim 1, wherein no process of said plurality of processes holds a lock

2   issued by said lock management system for said resource.

1 3.   The method of claim 1, wherein the steps further include:

2   said first requester receiving said notification; and

3   in response to receiving said notification, said first requester transmitting another

4   request to said lock management system for said particular lock on said resource.

1 4.   The method of claim 3, wherein the step of said first requester transmitting another

2   request includes transmitting second data that indicates that said blocking condition

3   should no longer cause denial of a request for said lock of said resource.

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1   5.   The method of claim 4, wherein the steps further include said lock management

2   system processing said other request without denial based on said second data.

1   6.   The method of claim 1, wherein:

2   a second process of said plurality of processes is performing an operation that causes

3   said blocking condition;

4   said first data identifies another resource locked by said second process for which

5   said first requester may acquire a lock when said blocking condition should no

6   longer cause denial of a request for said lock of said resource; and

7   wherein the step of transmitting said second request includes transmitting a request

8   for said lock on said other resource.

1   7.   The method of claim 1, wherein:

2   said first requester is a process of said plurality of processes;

3   wherein said resource is a data block in a b-tree index; and

4   wherein a second process of said plurality of processes is performing a block split

5   operation on said data block.

1   8.   A method of managing locks by a distributed lock management system, the method

2   comprising the steps of:

3   a first lock manager on a first node receiving a first request for a first lock on a

4   resource from a first requester;

5   wherein said distributed lock management system includes said first lock manager;

6   determining that said first request may not be granted because of a blocking

7   condition;

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8   said first lock manager storing in a data structure first data that may be used by said

9   first requester to obtain notification that said blocking condition should no

10   longer cause denial of a request for a lock on said resource; and

11   said first lock manager transmitting to said first requester a first response that:

12   indicates that said first request is denied, and

13   includes a copy of said first data.

1   9.   The method of claim 8, wherein the steps include:

2   receiving a message that indicates that said blocking condition should no longer cause

3   denial of a request for a lock on said resource; and

4   modifying said data structure to indicate that said blocking condition should no longer

5   cause denial of a request for a lock on said resource.

1   10.   The method of claim 9, wherein the step of receiving said message includes receiving

2   said message from said first requester.

1   11.   The method of claim 8, wherein:

2   the steps further include said first lock manager transmitting to another lock manager

3   of said distributed lock management system a message requesting said first

4   lock on said resource; and

5   wherein the step of determining is based on a second response received from said

6   other lock manager indicating that said first request cannot be granted;

7   wherein said second response includes a copy of said first data.

1   12.   The method of claim 8, wherein the steps further include:

2   receiving a second request for another lock on said resource;

3   determining, based on said first data, that said second request may not be granted;

4   said first lock manager transmitting to said second requester another response that:

5   indicates that said second request is not granted, and

6   includes a copy of said first data.

1   13.   The method of claim 12, wherein:

2   said first lock manager is a master of said resource; and

3   wherein the step of receiving said second request includes receiving said second

4   request from another lock manager.

1   14.   The method of claim 12, wherein:

2   said first lock manager and a process are on a node, wherein said process is different

3   than said first requester; and

4   the step of receiving said second request includes receiving said second request from

5   said process.

1   15.   The method of claim 8, wherein:

2   said distributed lock management system includes a master for said resource; and

3   wherein no lock is currently granted for said resource by said master.

1   16.   A computer-readable medium carrying one or more sequences of instructions for

2   handling lock contention, wherein execution of the one or more sequences of

3   instructions by one or more processors causes the one or more processors to perform

4   the steps of:

5   a first requester transmitting to a lock management system a first request for a

6   particular lock on a resource;

7   wherein said lock management system manages locks on resources that may be

8   granted to a plurality of processes that can access said resource;

9 receiving a message from said lock management system that indicates that said first

10   request to lock a resource is denied;

11 wherein a blocking condition caused the denial of said first request;

12 wherein said message includes first data; and

13 based on said first data, said first requester transmitting a second request for

14   notification that said blocking condition should no longer cause denial of a

15   request for a lock on said resource.

1 17. The computer-readable medium of claim 16, wherein no process of said plurality of

2   processes holds a lock issued by said lock management system for said resource.

1 18. The computer-readable medium of claim 16, wherein the steps further include:

2   said first requester receiving said notification; and

3   in response to receiving said notification, said first requester transmitting another

4   request to said lock management system for said particular lock on said resource.

1 19. The computer-readable medium of claim 18, wherein the step of said first requester

2   transmitting another request includes transmitting second data that indicates that said

3   blocking condition should no longer cause denial of a request for said lock of said

4   resource.

1 20. The computer-readable medium of claim 19, wherein the steps further include said

2   lock management system processing said other request without denial based on said

3   second data.

1 21. The computer-readable medium of claim 16, wherein:

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2   a second process of said plurality of processes is performing an operation that causes

3   said blocking condition;

4   said first data identifies another resource locked by said second process for which

5   said first requester may acquire a lock when said blocking condition should no

6   longer cause denial of a request for said lock of said resource; and

7   wherein the step of transmitting said second request includes transmitting a request

8   for said lock on said other resource.

1   22.   The computer-readable medium of claim 16, wherein:

2   said first requester is a process of said plurality of processes;

3   wherein said resource is a data block in a b-tree index; and

4   wherein a second process of said plurality of processes is performing a block split

5   operation on said data block.

1   23.   A computer-readable medium carrying one or more sequences of instructions for

2   managing locks by a distributed lock management system, wherein execution of the

3   one or more sequences of instructions by one or more processors causes the one or

4   more processors to perform the steps of:

5   a first lock manager on a first node receiving a first request for a first lock on a

6   resource from a first requester;

7   wherein said distributed lock management system includes said first lock manager;

8   determining that said first request may not be granted because of a blocking

9   condition;

10   said first lock manager storing in a data structure first data that may be used by said

11   first requester to obtain notification that said blocking condition should no

12   longer cause denial of a request for a lock on said resource; and

13   said first lock manager transmitting to said first requester a first response that:

14   indicates that said first request is denied, and

15   includes a copy of said first data.

1   24.   The computer-readable medium of claim 23, wherein the steps include:

2   receiving a message that indicates that said blocking condition should no longer cause

3   denial of a request for a lock on said resource; and

4   modifying said data structure to indicate that said blocking condition should no longer

5   cause denial of a request for a lock on said resource.

1   25.   The computer-readable medium of claim 24, wherein the step of receiving said

2   message includes receiving said message from said first requester.

1   26.   The computer-readable medium of claim 23, wherein:

2   the steps further include said first lock manager transmitting to another lock manager

3   of said distributed lock management system a message requesting said first

4   lock on said resource; and

5   wherein the step of determining is based on a second response received from said

6   other lock manager indicating that said first request cannot be granted;

7   wherein said second response includes a copy of said first data.

1   27.   The computer-readable medium of claim 23, wherein the steps further include:

2   receiving a second request for another lock on said resource;

3   determining, based on said first data, that said second request may not be granted;

4   said first lock manager transmitting to said second requester another response that:

5   indicates that said second request is not granted, and

6   includes a copy of said first data.

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1   28.   The computer-readable medium of claim 27, wherein:

2   said first lock manager is a master of said resource; and

3   wherein the step of receiving said second request includes receiving said second

4   request from another lock manager.

1   29.   The computer-readable medium of claim 27, wherein:

2   said first lock manager and a process are on a node, wherein said process is different

3   than said first requester; and

4   the step of receiving said second request includes receiving said second request from

5   said process.

1   30.   The computer-readable medium of claim 23, wherein:

2   said distributed lock management system includes a master for said resource; and

3   wherein no lock is currently granted for said resource by said master.

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